



U.S. Department of Energy
Energy Efficiency and Renewable Energy

Regulatory Education & Outreach for New Technologies

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U.S. Department of Energy**



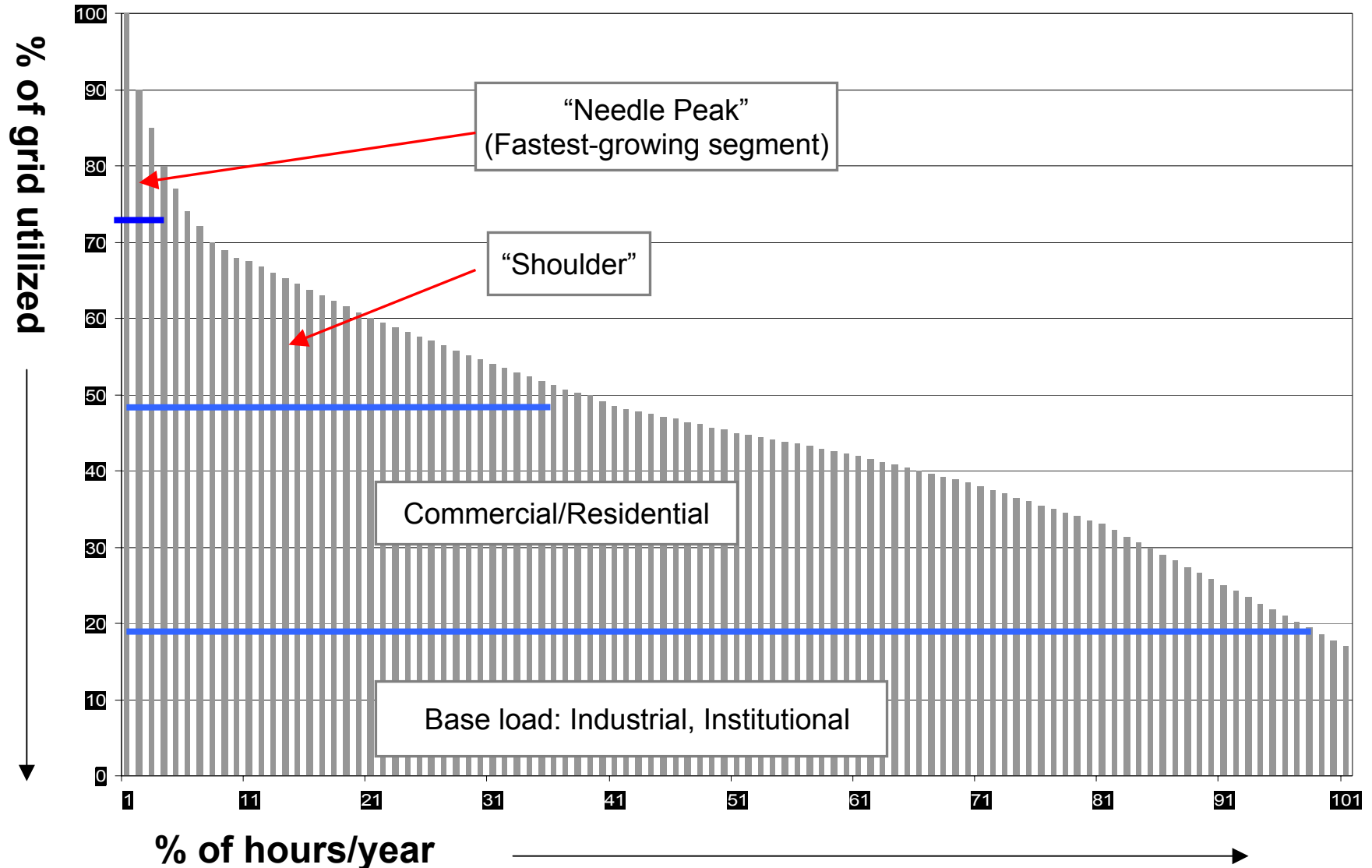
Electricity Regulation Post-1929

“We need a utility system that...”

1. Provides universal access (rural customers and small towns must not be left out)
2. Operates at a minimum level of reliability (can't have whole communities without power for weeks or months)
3. Operates at an acceptable cost (utilities allowed to spread costs across all customers for 30-year periods)



Load Duration Curve (annualized)





U.S. Department of
Energy

**Up to 97% of the Btus
in the original fuel are lost by the time we produce
an end product; this (1) impacts the cost of
business in the U.S.; (2) affects the price of electricity, heating
and air conditioning to you; and (3) plays a role
in domestic security**

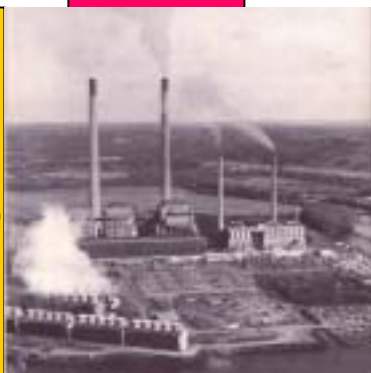
Losses

67%

100%



Fuel in



33%



(7-11% of electricity)

4%

29%



20%



26%

**Useful
Light**

3%



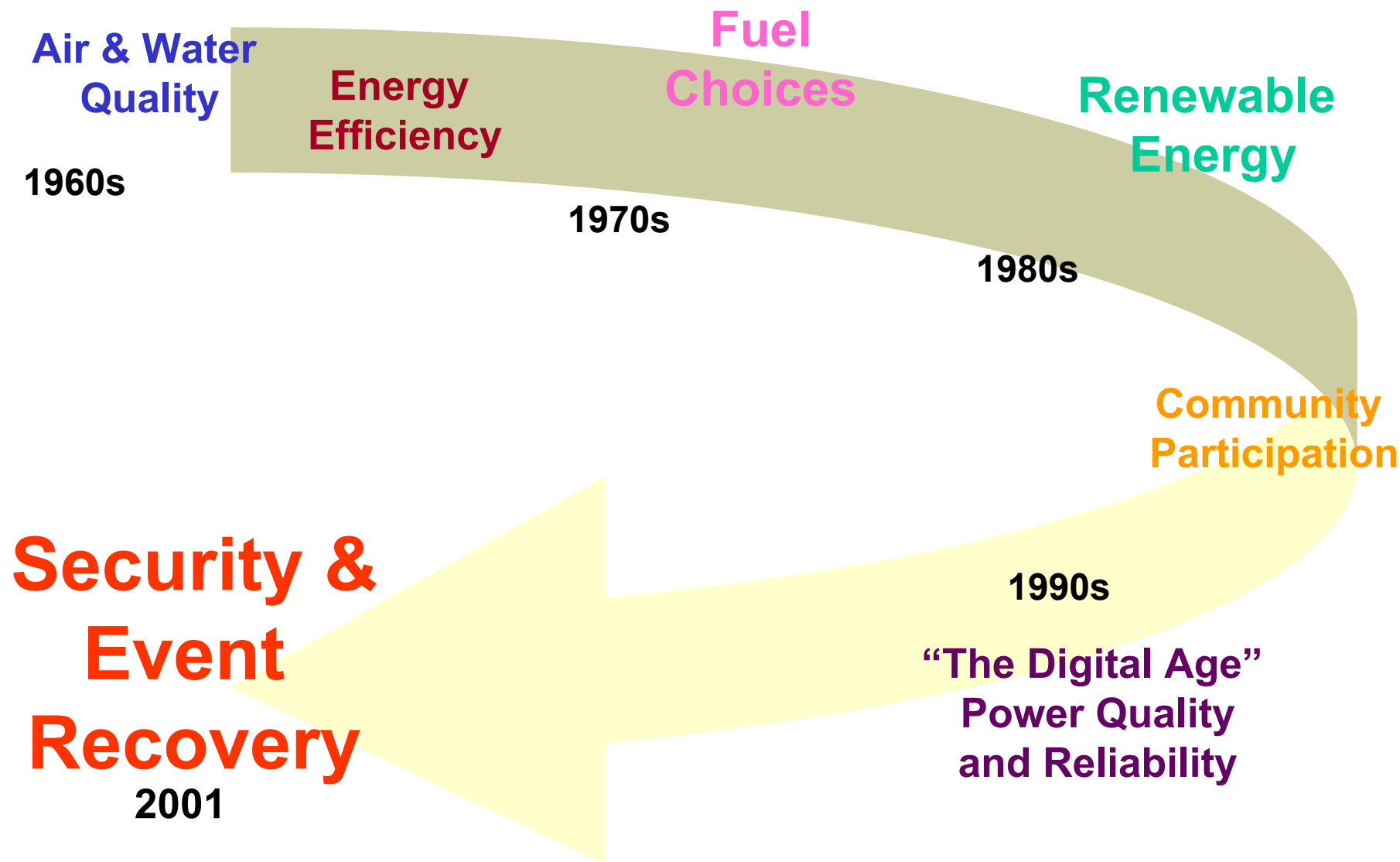
12%



25%



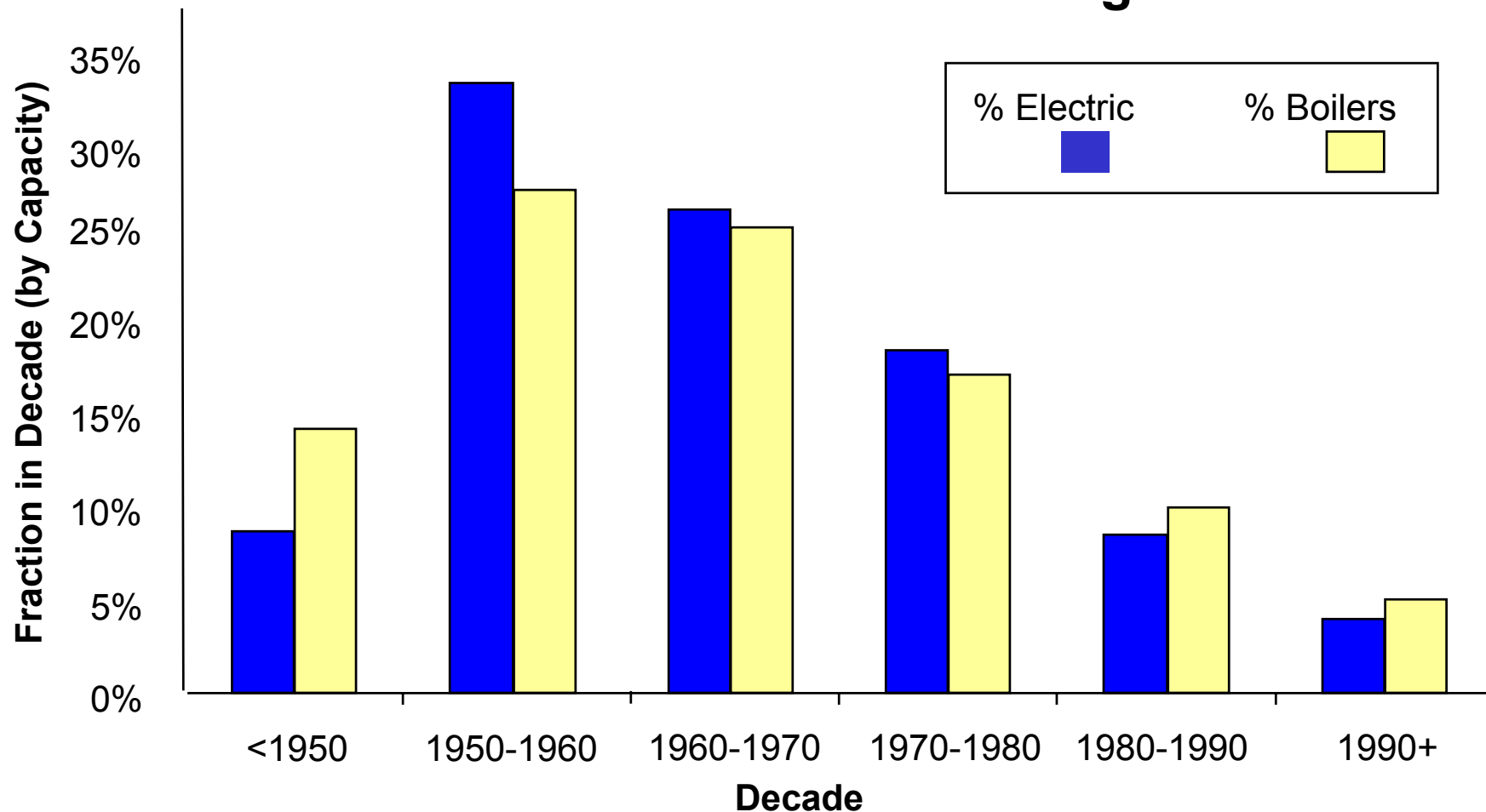
Over time, new values emerged





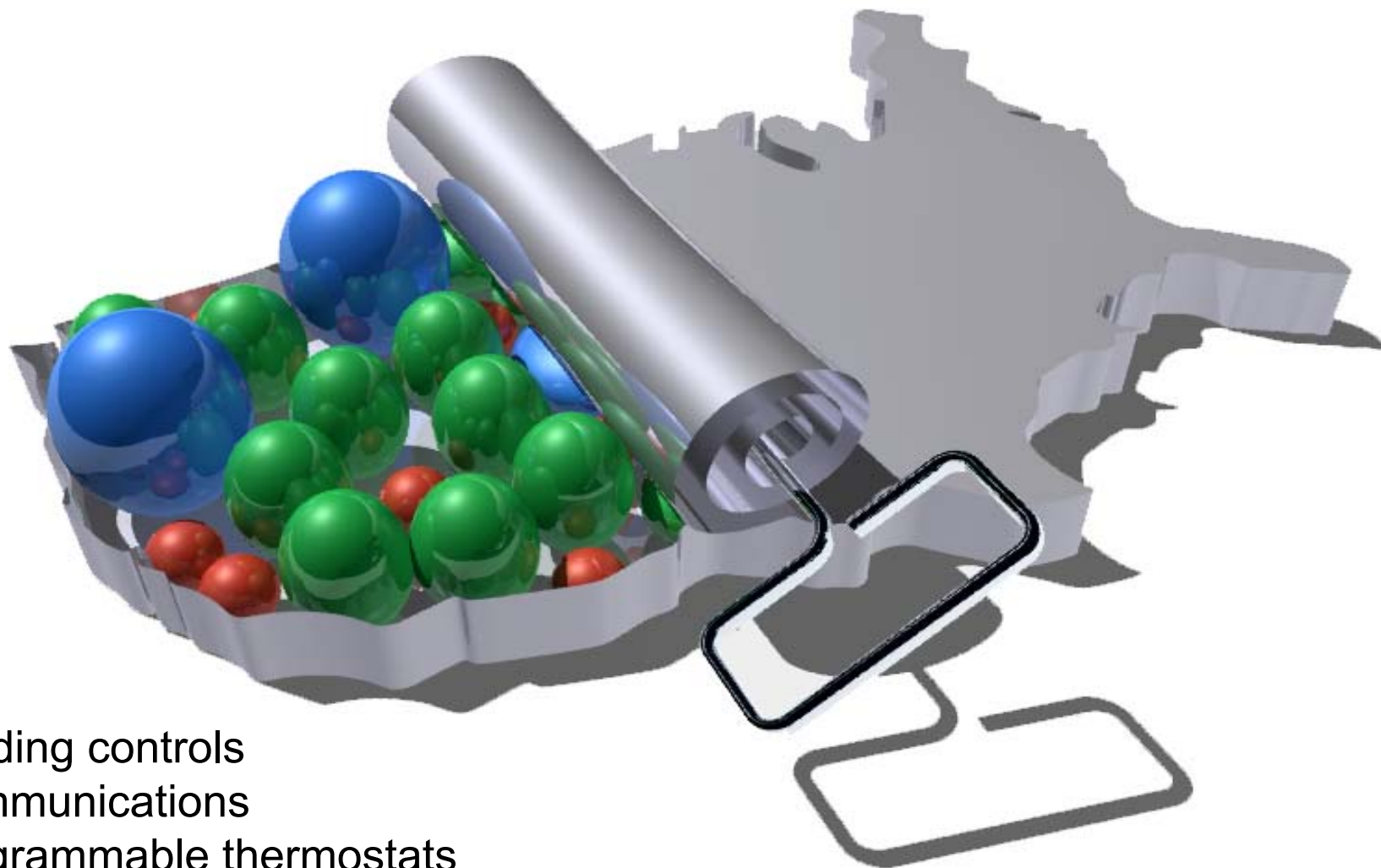
It takes a LONG time to change out power plant equipment

Boilers and Electric Plant Vintage





While U.S. consumers are getting smarter...



Building controls
Communications
Programmable thermostats



The Federal Role

The DOE does not REGULATE energy (your state utility commission does that); it furthers the Administration's goals by:

- ✓ Long-term R&D programs
- ✓ Technical and economic analyses, public and regulatory education programs



Office of Energy Efficiency and Renewable Energy R&D Programs

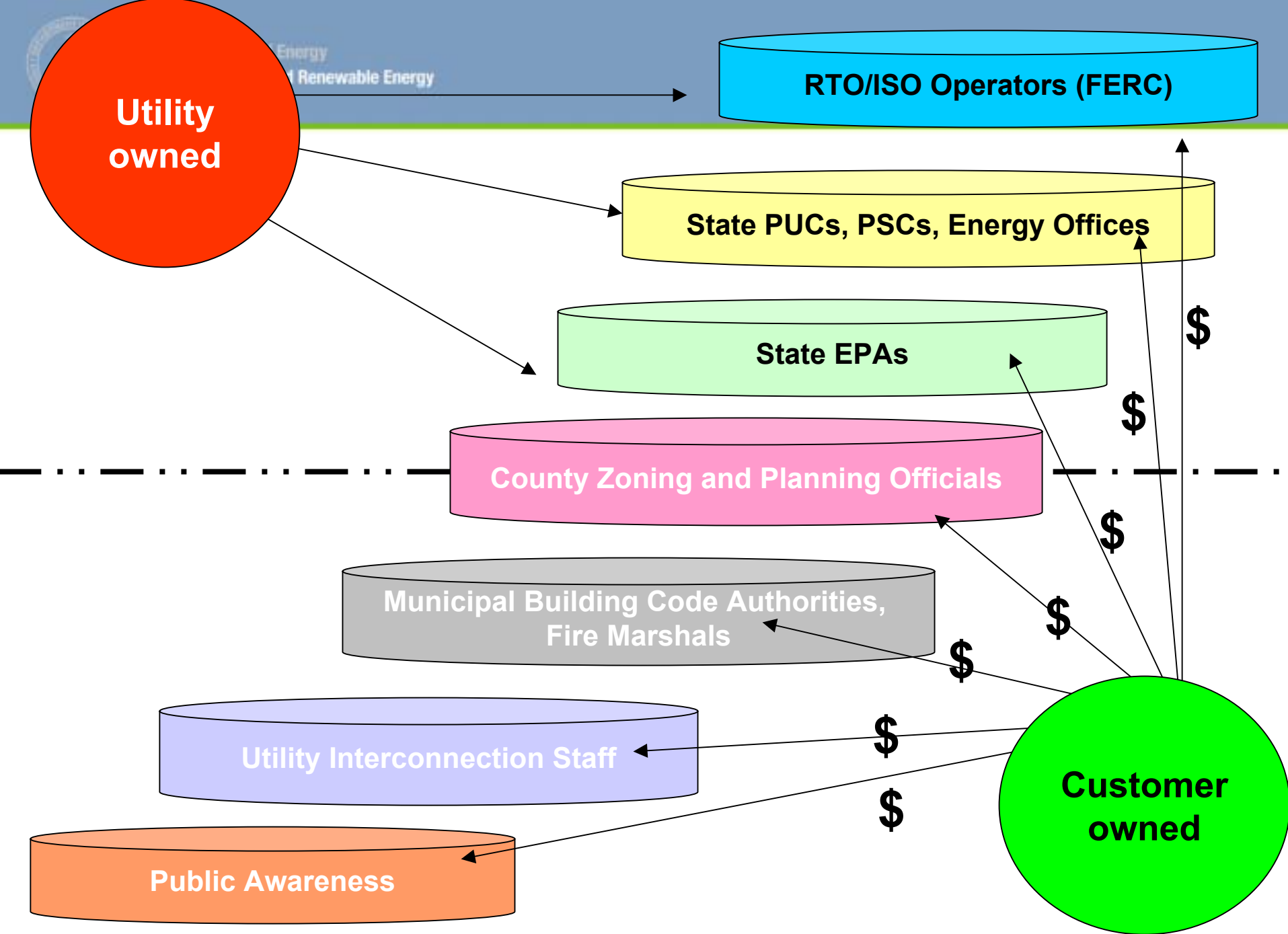
- Microturbines, reciprocating engine generator sets, fuel cells, solar heaters & photovoltaic systems
- Materials, energy storage, power electronics
- Fuel production systems, transmission & storage
- Combined heat and power (CHP); “power parks;” building cooling, heating, & power (BCHP, thermally-activated technologies)
- Equipment, building, and electrical interconnection standards; communications & control



And at the end of the R&D program...



...we hope it finds a market



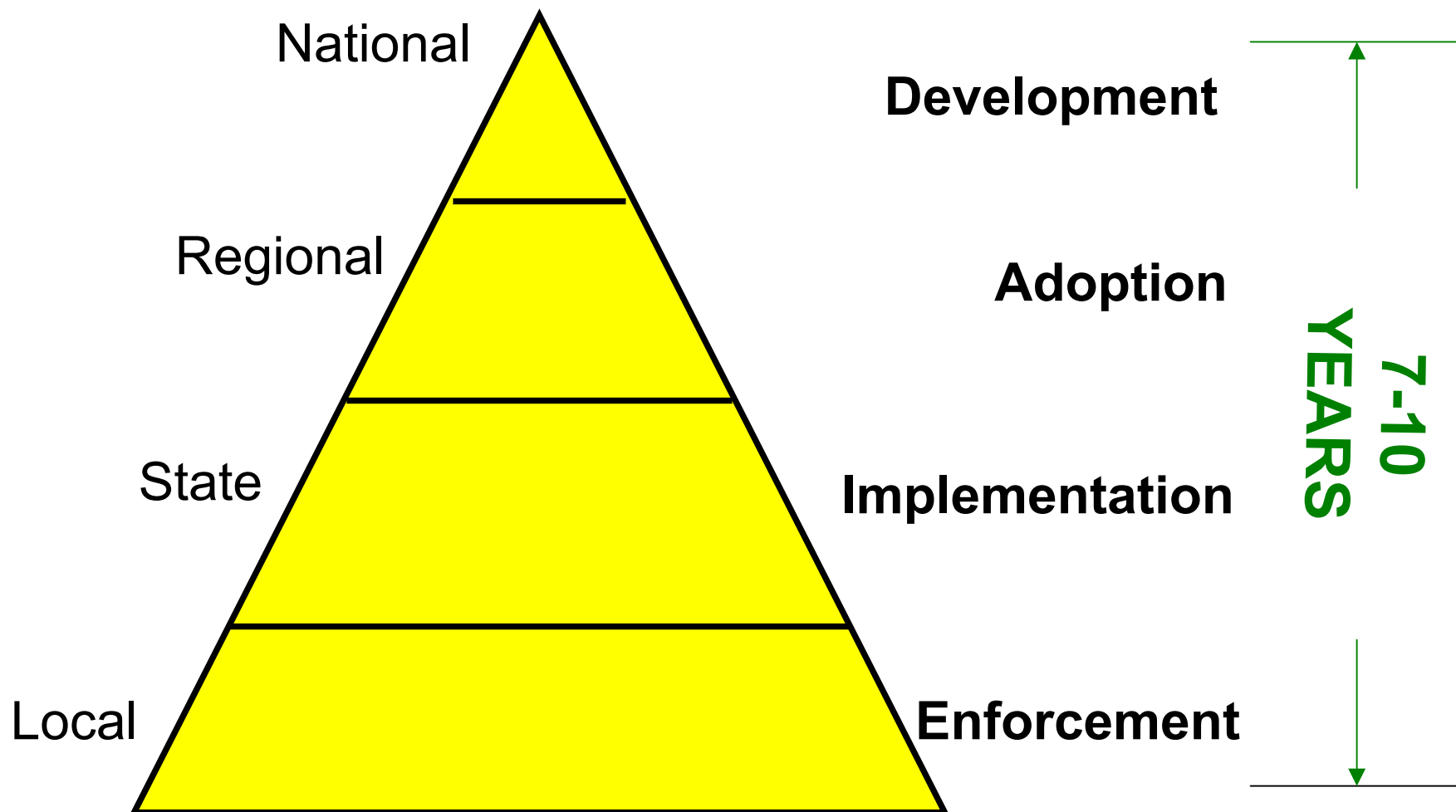


DE Codes & Standards U.S. DOE Program Support

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From National Standards to Local Building Codes



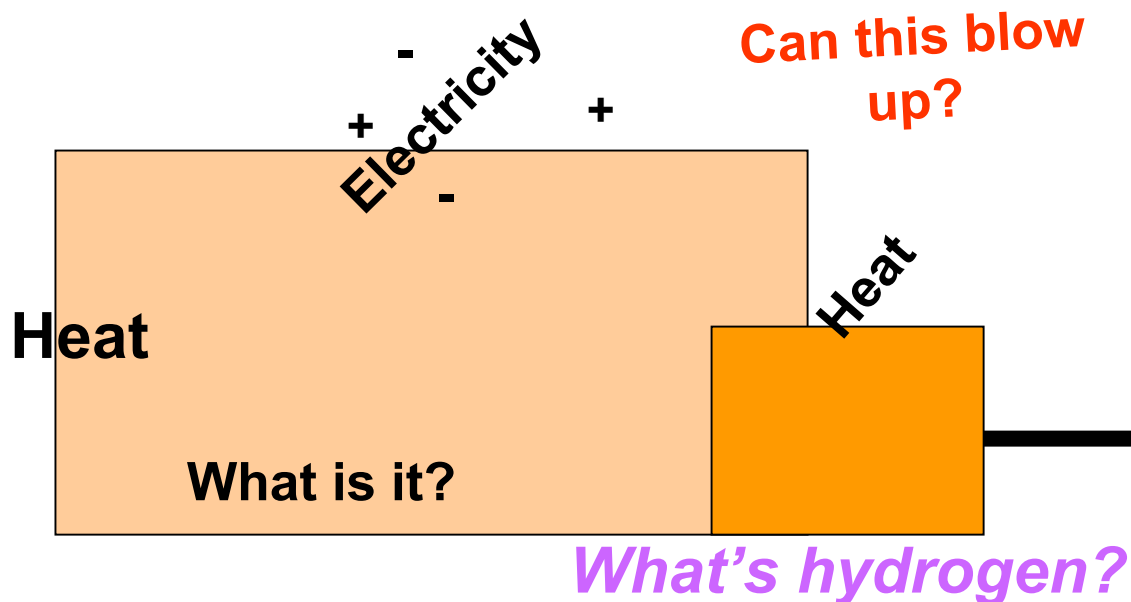
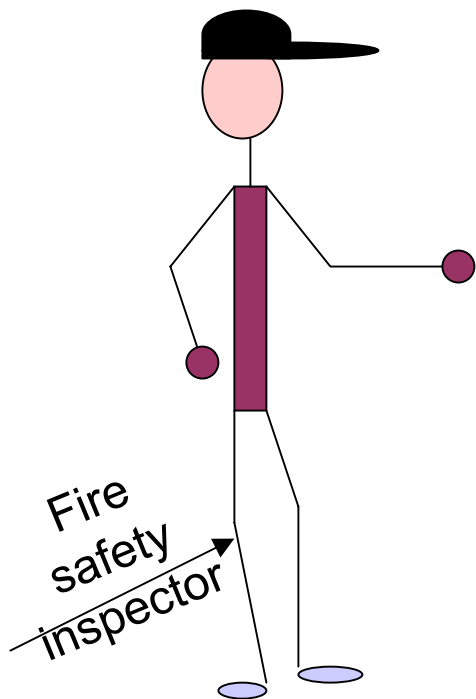
A large yellow arrow pointing to the right, with the word "Meanwhile..." written in bold blue text inside it. To the left of the arrow's tail are two vertical yellow bars of different heights.

Meanwhile...



“Am I on camera?.... Is this one of those hidden camera shows?”

Actual fuel cell permitting experience (location omitted)





Case Study – Fuel Cell

- 2-5kW PEM fuel cell system and fuel reformer
- Utilizing methanol as feedstock on first units
- 300-gallon “tote” retrofitted as onsite storage tank, piping system
- Relevant code: NFPA 30 and 30A, Combustible Liquid Fuels
- BPA has funded 110 alpha and beta units, currently installing first 10 units across Pacific Northwest



Case Study – Fuel Cell

- Fire Marshals in urban areas requiring the following on methanol systems:
 - Additional setbacks from walls, doors, windows, public access
 - Automatic shut-off valve during periods of no demand
 - Signage, fire extinguisher
 - Tank must be fenced, protected from vehicular impact
 - All pipes that enter building must be welded; all invisible joints must be welded



Case Study – Fuel Cell

- Methanol fuel system requirements, cont:
 - 12-ft. ventilation stack
 - Emergency relief venting system – 18-in. manhole w/loose bolts
 - Seismic calculations
 - Secondary containment system
 - Sight glass on storage container
 - Static electricity management system – grounded tank, toad, etc.
 - Pressure test on all pipes and tanks, with Fire Marshall observing
 - Road uneven – must be re-graded



So.....

**Welcome to the U.S. DOE
Road Show!**

ASK QUESTIONS

Ask questions ask questions ask questions ask questions ask